

CLAIMS

1. An electronic endoscope apparatus having a video-scope with an image sensor and a video-processor, comprising:

a light source that radiates light for illuminating a subject;

a pixel luminance detector that detects a luminance level of each pixel in a plurality of pixels, that forms a subject image displayed on a display, in accordance with image-pixel signals read from said image sensor;

a division setter that divides the subject image into a plurality of blocks composed of given pixels;

an average block luminance calculator that calculates a plurality of average block-luminance-levels, each of which indicates a substantial average-luminance-level of the corresponding block, the average block-luminance-levels being calculated from a plurality of luminance levels of pixels arranged in the corresponding block;

a peak-luminance determiner that compares the average block-luminance-levels with each other to determine a substantially maximum average block-luminance-level from the plurality of average block-luminance-levels as a peak luminance level;

a representative luminance calculator that calculates a representative luminance level indicating a brightness of the subject image; and

a brightness adjuster that adjusts the brightness of the subject image in accordance with the representative luminance level.

2. The electronic endoscope apparatus of claim 1, wherein
5 the brightness adjuster adjusts an amount of light radiated from said light source toward the subject so as to maintain a proper brightness.

3. The electronic endoscope apparatus of claim 1, wherein the brightness adjuster adjusts an exposure time of the image
10 sensor so as to maintain a proper brightness.

4. The electronic endoscope apparatus of claim 1, further comprising a peak metering-area setter that sets a peak metering-area around a center portion of the subject image,
wherein said peak-luminance determiner determines the
15 peak luminance level in accordance with blocks included in the peak metering-area.

5. The electronic endoscope apparatus of claim 1, further comprising:

a peak metering-area setter that sets a peak
20 metering-area around a center portion of the subject image;

an average metering-area setter that sets an average metering-area in the subject image so as to include at least a peripheral portion of the subject image; and

an average luminance calculator that calculates an
25 average luminance level indicating a substantial average

luminance level in accordance with blocks included in the average metering-area,

wherein said peak-luminance determiner determines the peak luminance level in accordance with blocks included in the peak metering-area, and

wherein said representative luminance calculator calculates the representative luminance level in accordance with the peak luminance level and the average luminance level.

6. The electronic endoscope apparatus of claim 5, wherein said representative luminance calculator multiplies the peak luminance level by a peak weighted coefficient and multiplies the average luminance level by an average weighted coefficient to obtain the representative luminance level.

7. The electronic endoscope apparatus of claim 1, further comprising:

a peak metering-area setter that sets a first peak metering-area around a center portion of the subject image, and sets a second peak metering-area so as to surround the first peak metering-area,

wherein said peak-luminance determiner determines a first peak luminance level in accordance with blocks included in the first peak metering-area, and determines a second peak luminance level in accordance with blocks included in the second peak metering-area, and

wherein said representative luminance calculator

calculates the representative luminance level in accordance with the first and second peak luminance levels.

8. The electronic endoscope apparatus of claim 7, wherein said representative luminance calculator multiplies the first
5 peak luminance level by a first peak weighted coefficient and multiplies the second peak luminance level by a second peak weighted coefficient to obtain the representative luminance level, and

wherein the first peak weighted coefficient is larger
10 than the second peak weighted coefficient.

9. The electronic endoscope apparatus of claim 7, further comprising:

an average metering-area setter that sets an average metering-area in the subject image so as to include at least
15 a peripheral portion of the subject image; and

an average luminance calculator that calculates an average luminance level indicating a substantial average luminance level in accordance with blocks included in the average metering-area,

20 wherein said representative luminance calculator calculates the representative luminance level in accordance with the first peak luminance level, the second peak luminance level, and the average luminance level.

10. The electronic endoscope apparatus of claim 1, wherein
25 said division setter sets the plurality of blocks such that

each block has substantially the same size and substantially the same number of pixels.

11. The electronic endoscope apparatus of claim 1, wherein said division setter sets a plurality of different types of blocks, each of which is different from an other type of block with respect to at least one of the number of pixels and the size.

12. The electronic endoscope apparatus of claim 7, wherein said division setter sets a first plurality of blocks composed of a first number of pixels, and sets a second plurality of blocks composed of a second number of pixels more than the first number of pixels,

wherein the division setter sets the second plurality of blocks in one of the first peak metering-area and the second peak metering-area.

13. The electronic endoscope apparatus of claim 4, further comprising a treatment tool detector that detects the use of a treatment tool utilizing a treatment tool tube provided in said video-scope,

wherein said peak metering-area setter sets the peak metering-area so as to exclude a tool displaying area, in which a tip portion of the treatment tool is displayed.

14. An automatic brightness adjusting apparatus for endoscope comprising:

a pixel luminance detector that detects a luminance level

of each pixels in a plurality of pixels, that forms a subject image displayed on a display, in accordance with image-pixel signals read from an image sensor, which is provided in a video-scope;

5 an average block luminance calculator that calculates a plurality of average block-luminance-levels for a plurality of blocks, which is defined by dividing the subject image, each of the plurality of average block-luminance-levels indicates a substantial average luminance level of a block and is calculated from a plurality of luminance levels of pixels
10 arranged in corresponding block;

 a peak-luminance determiner that compares the average block-luminance-levels with each other to determine a substantially maximum average block-luminance-level from the plurality of average block-luminance-levels as a peak
15 luminance level;

 a representative luminance calculator that calculates a representative luminance level indicating a brightness of the subject image; and

20 a brightness adjuster that adjusts the brightness of the subject image in accordance with the representative luminance level.

15. A method for adjusting a brightness of a displayed subject image obtained by using an electronic endoscope apparatus,
25 comprising:

detecting a luminance level of each pixels in a plurality of pixels, that forms a subject image displayed on a display, in accordance with image-pixel signals read from an image sensor, which is provided in a video-scope;

5 calculating a plurality of average
block-luminance-levels for a plurality of blocks, which is defined by dividing the subject image, each of the plurality of average block-luminance-levels indicates a substantial average luminance level of a block and is calculated from a
10 plurality of luminance levels of pixels arranged in corresponding block;

 comparing the average block-luminance-levels with each other to determine a substantially maximum average block-luminance-level from the plurality of average
15 block-luminance-levels as a peak luminance level;

 calculating a representative luminance level, which indicates a brightness of the subject image; and

 adjusting the brightness of the subject image in accordance with the representative luminance level.

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